ForHeal Forestry Higher Education Advancement in Laos

Co-funded by the Erasmus+ Programme of the European Union

Biotic Harmfull Factors in TS

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Biotic harmfull factors

- Man
  - man and cattle (livestock)
- Wild-living animals
  - -vertebrates
  - - non-vertebrates
  - (arthropods and others)
- Pathogenic fungi
- Microbial factors

Man as a harmfull factor to forests

- Human population pressure
- Logging
- Incorrectness in forestry ((wrong forest politics, foresters (forest managers) mistakes))

What is human population pressure?

- people have been deforesting 1000 s years for shelter – place for homes, food – pasture for livestock, fields for crops, fuel, etc.)
- due to consequent expansion of infrastructure, the forested land is gradually turned to agricultural land and more populated or even urbanized land
- population growth makes this process instant and rapid

The main factor in population pressure is the conflict among agriculture and the forest:

a) livestock grazing, increasing pasture land

b) increasing field land

Livestock pasturing (grazing)

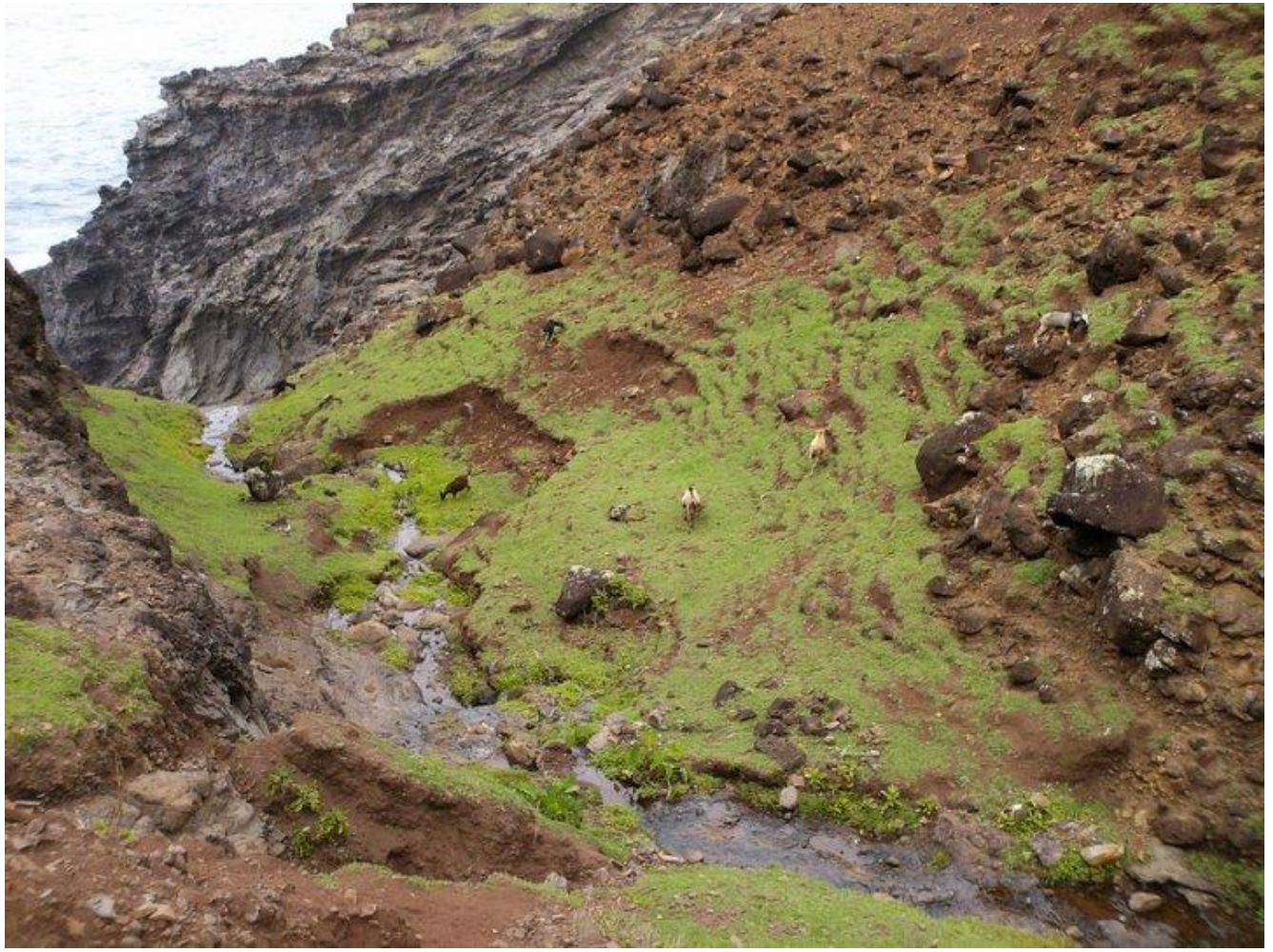
- is one of the main components of population pressure to forest in agricultural societies
- in most developed countries grazing livestock in the forest is prohibited by law
- while in the developing countries it is quite common and even (usually) supported by government

- by grazing livestock are the old trees damaged and the young trees destroyed (eaten)

- the reforestation is limited to plots without livestock (separated and protected by fences)

Goats – „niblers“

Goats on one of Hawaiian islands (note consequent soil erosion)



Sheeps – „browsers“

In the sheep pasture, old trees can exist, while young tress cannot.

Horses are able to destroy old trees by browsing bark

Horses are able to destroy old trees by browsing bark

Wood for energy

- developing countries rely heavily to wood for energy
- in sub-saharan Africa nearly total energy is from fuelwood
- in other developing countries the energy from fuelwood ranges between 30 – 80%, in average 40%
- the demand for wood as fuel rises with population growth

In the U.S.A.

(Once Upon a Time in the West)

Fuelwood prepared for transport (Bolivia)

Note: the forest is, at best, capable to product only fuelwood

In Peru

In Afghanistan

In Madagascar

In Libya

In Nepal

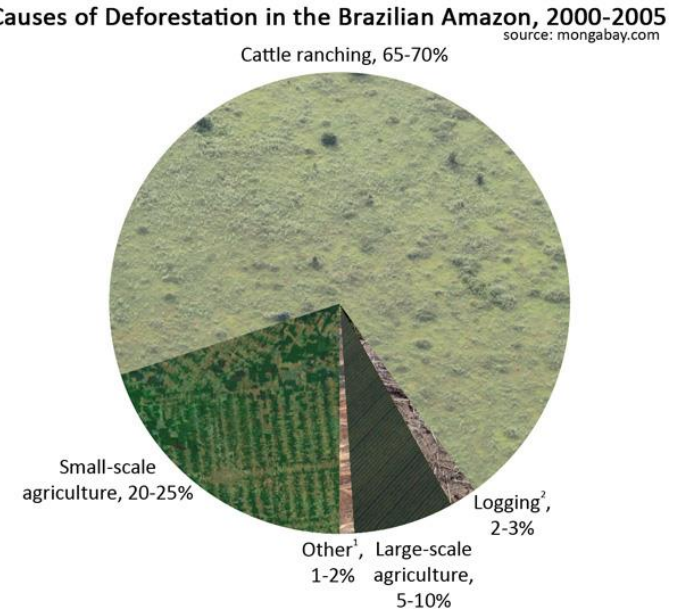
What is wrong in using wood as a fuel??

- generally nothing, but…..
- overusing wood as a fuel is done without any care of the forest and its future productivity!!!!
- sometimes even the last trees in the dry or deserted land, or young trees in totally logged forests are destroyed for need for fuel wood

„Modern“ (todays) agriculture and deforestation:

- in the Amazon, industrial-scale cattle ranching and soybean production for world markets are increasingly important causes of deforestation
- in Indonesia, the conversion of tropical forest to commercial palm tree plantations to produce bio-fuels for export is a major cause of deforestation

Plantation of oil palms



Deforested areas were planted by oil palms

Logging

- logging is usually done by logging companies, seeking for profit from the logged wood
- the worst examples of logging is a logging of virgin forest in eastern Asia, south America and central Africa
- population pressure + logging activities = **Deforestation**

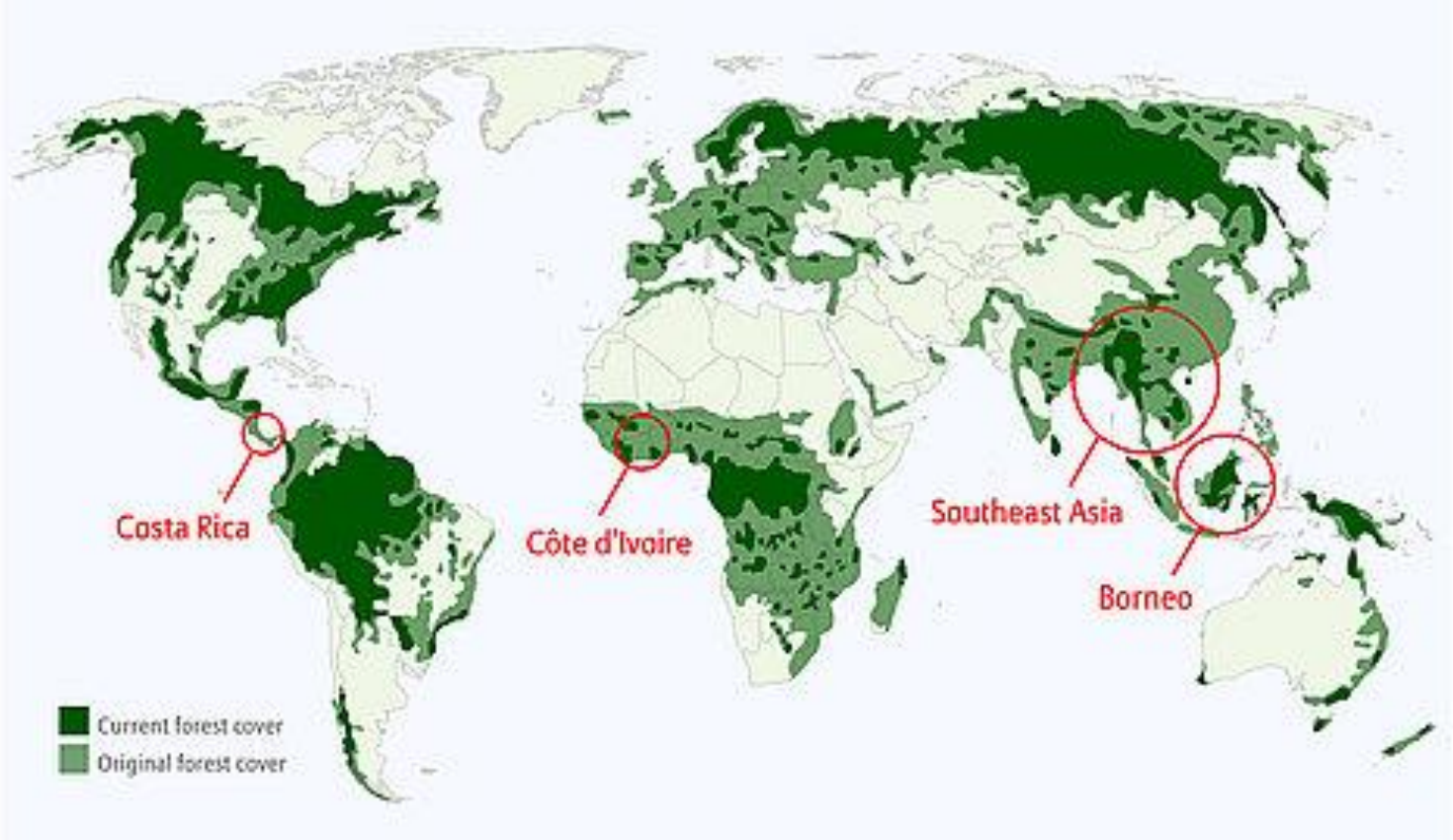
Logging starts at first with building roads

The loggers roads in the indonesian forest

Deforestation

- occurs as in developed as in undeveloped countries
- in developed countries the main reason of deforestation is industry, growing of cities, building new roads, dams on rivers, etc.
- in undeveloped countries are the main reasons building new roads to made the forest accessible, logging, new settlement, agricultural use of the deforested land
- local governments even support logging and the consequent colonization of logged areas, because the growth of population is great

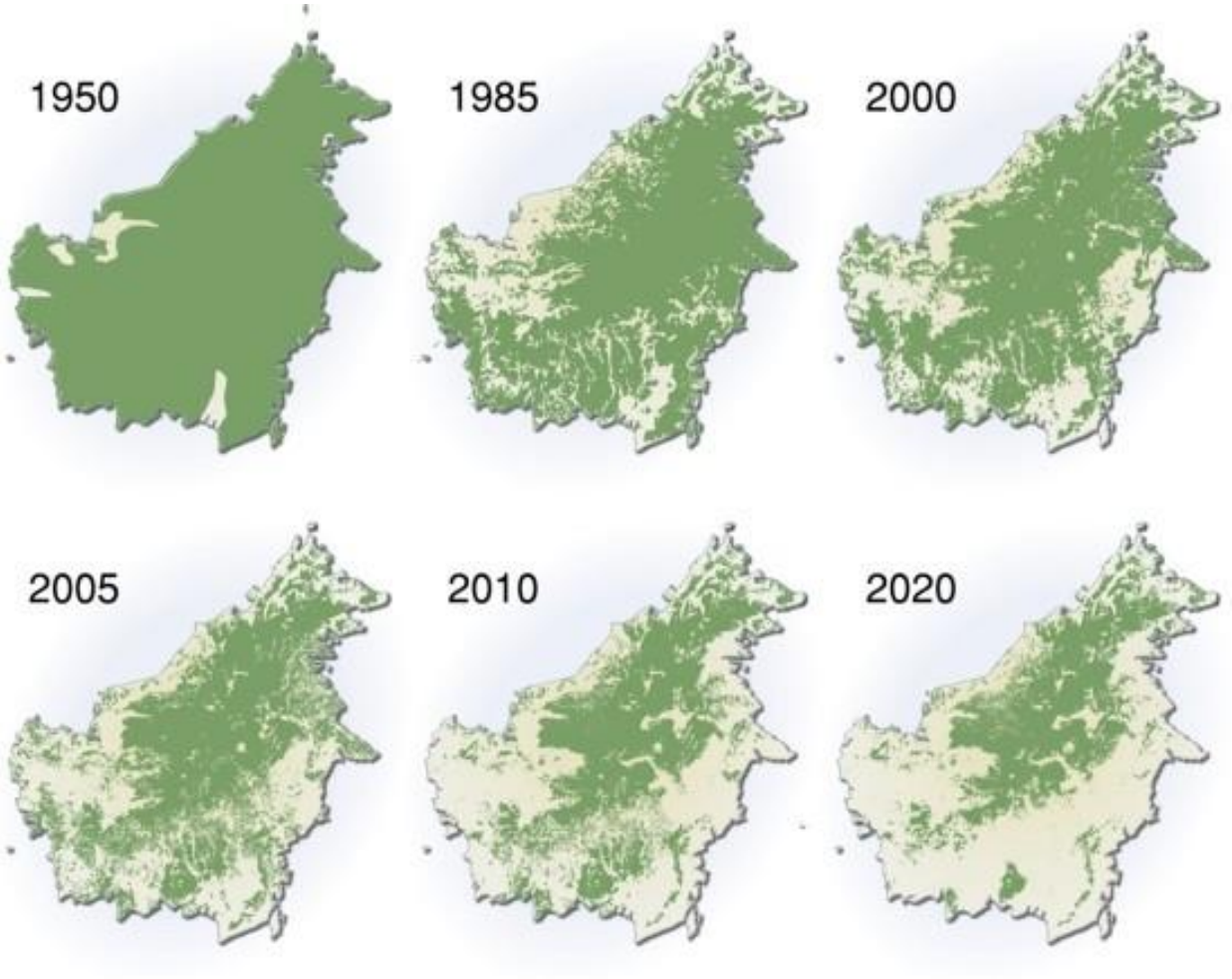
Deforestation worldwide



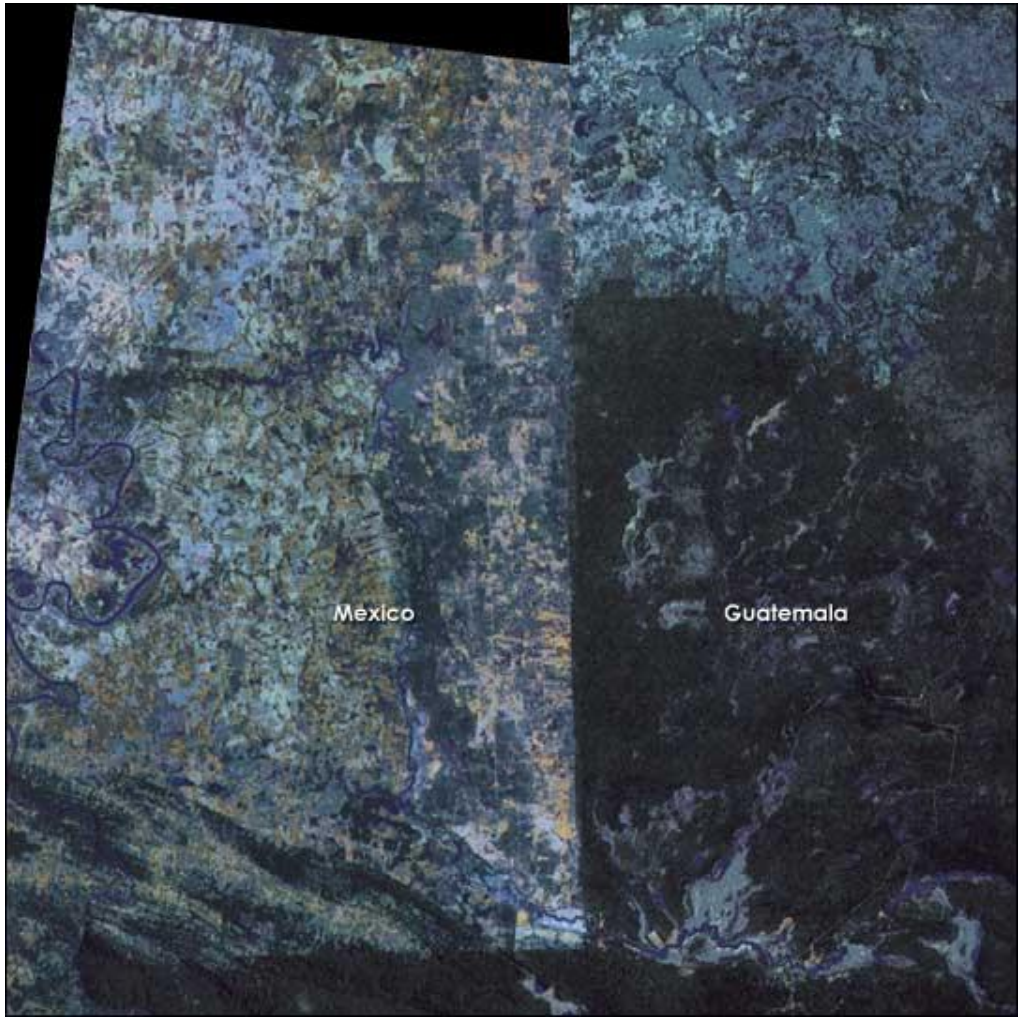
Aerial wiew of the deforestation in the Amazonia

More detailed picture of the deforestation in Amazonia

Deforestation in Borneo

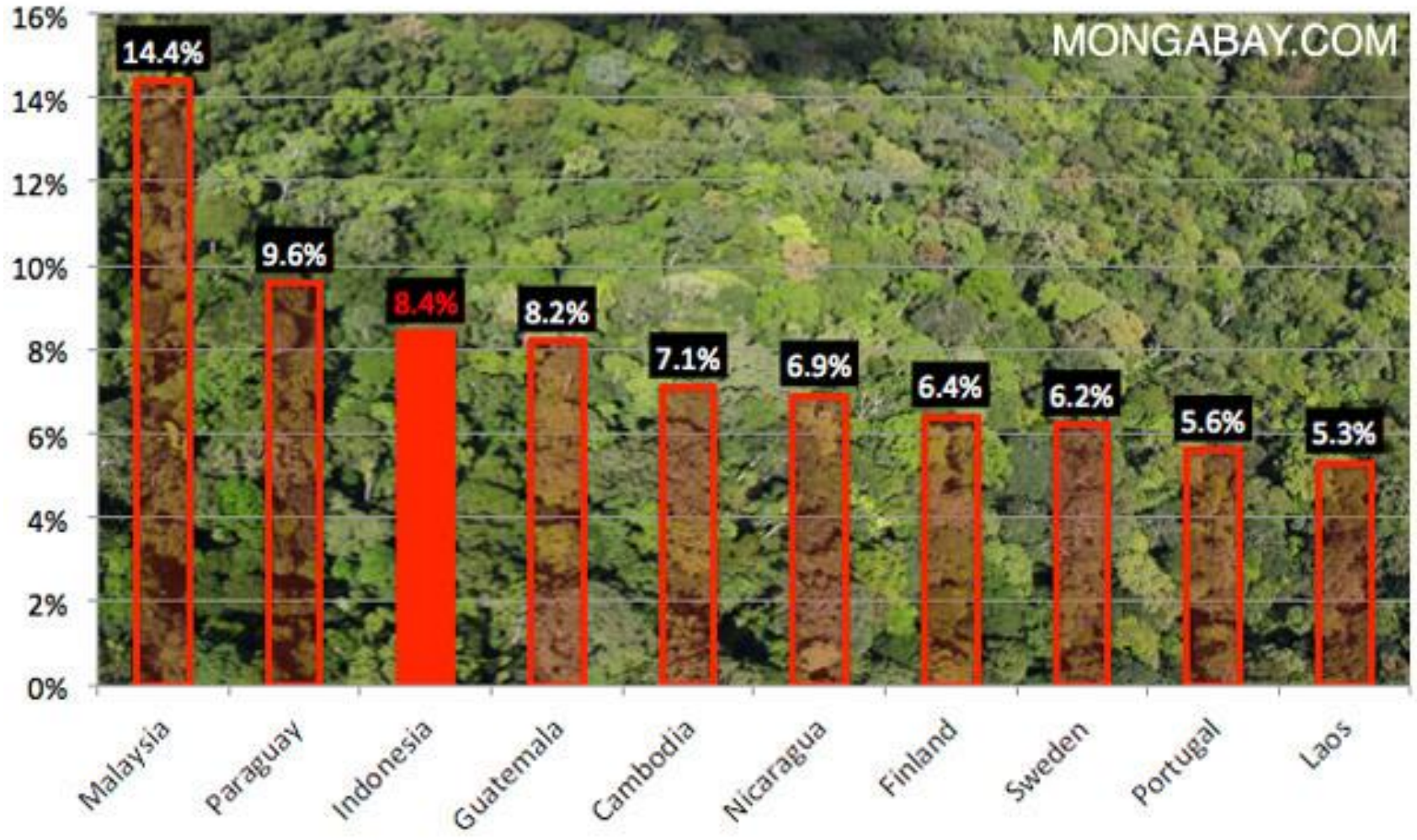


A border between mexico and Guatemala, showing great difference in forestation

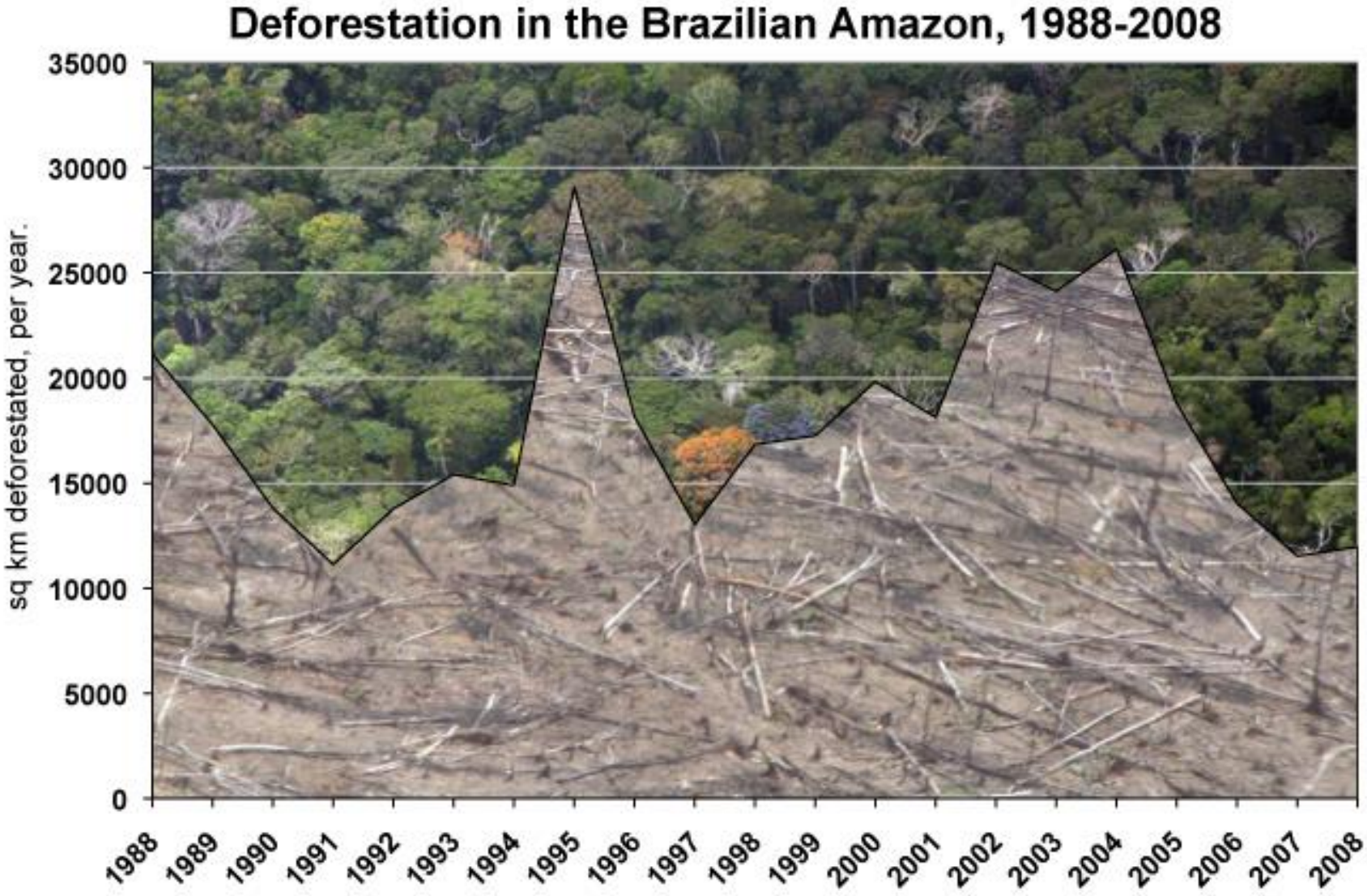


ForHeal

Major forest countries: Highest percentage forest loss, 2000-2012



Erasmus+


Deforestation in the Brazilian Amazon, 1988-2008
sq km deforestated, per year.
35000
30000
25000
20000
15000
10000
5000
0
1988
1989
1990
1991
1992
1993
1994
1995
1996
1997
1998
1999
2000
2001
2002
2003
2004
2005
2006
2007
2008

In consequence to deforestation, erosion occurs: Madagascar (note the rests of the forest)

Erosion in Guatemala

Erosion

- The eroded land is totally of no use.
- The only possibility is reforestation, which is very, very difficult and expensive, because:

1) There is little understanding and respect for **reforestation** by inhabitants (they are able to destroy young forest by grazing or for fuel wood)
2) There is **no or little support** (both financial, and in laws) in **local governments** (the reforestation of eroded land is very expensive and cannot be done without law support)
3) The choice of **tree species is limited** - only few are able to thrive in the extreme conditions of open areas
4) The **eroded soil** should be **stabilized** at first

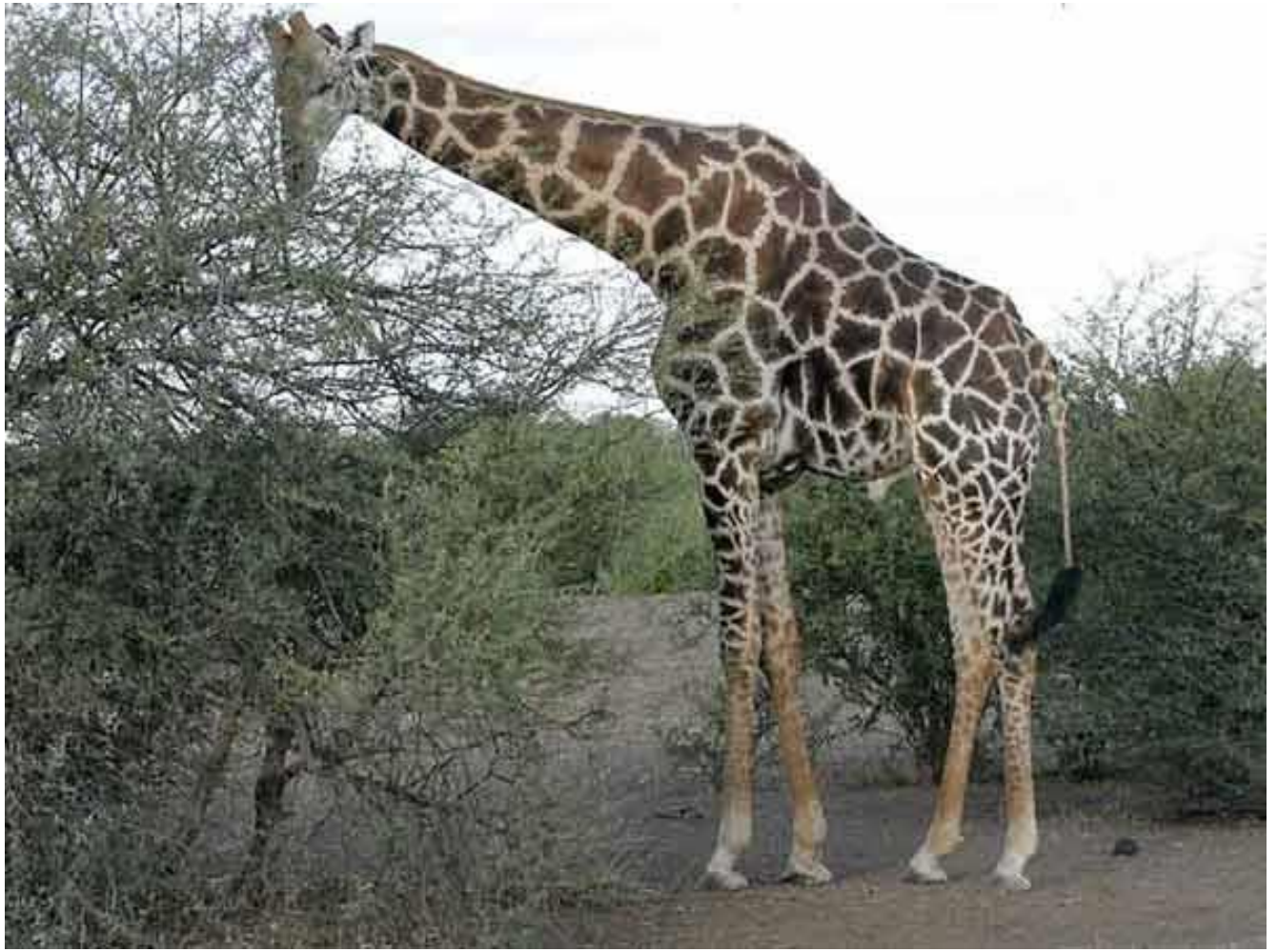
Wild living animals as a biotic harmful factor to forests

Even though wild animals are seeking home and food in forest, from the sight of the forest manager they are very harmful to forest.

- in some developed countries there are great troubles with wild game (Czech Republic, for example)
- in some undeveloped countries a productive forest cannot exist, because of large herbivorous species (Africa, for example)

elephants

giraffes



buffaloes

zebras

Animals vs. forests

The wealth of some African countries is more in wild animals than in forest, and, on the other hand, in some countries more in forest (wood)

- it is sensible to support both animals and forest (in special countries, and in special cases)
- in all cases, the production forests and the land inhabited by great herbivores should be separated.

Harmful species of insects

1) defoliators

2) bark and wood pests

3) other life strategy (root-, twig-, bud-, fruit-, seed- pests)

Defoliators

Defoliation is the removal of all or part of the foliage from the tree.

Classification based on:

- type of leaf feeding (with and without shelter);
- scientific order (Lepido-, Coleo- Hymenoptera)
- time of the growing season
- importance dependent on amount of defoliation caused, trees' regenerative ability, and time of defoliation

DEFOLIATORS

With shelter

Leaf miners

Web or tentmakers

Bag makers

Leaf rollers

Leaf tiers

Case bearers

DEFOLIATORS

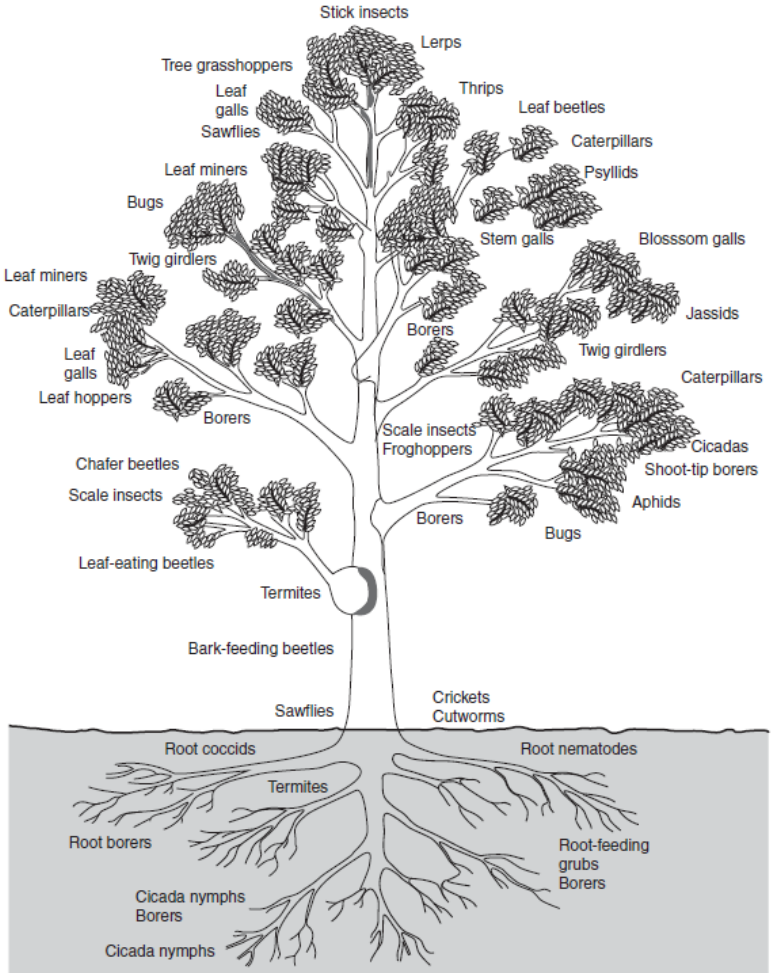
Without shelter

skeletonizers

shot-hole

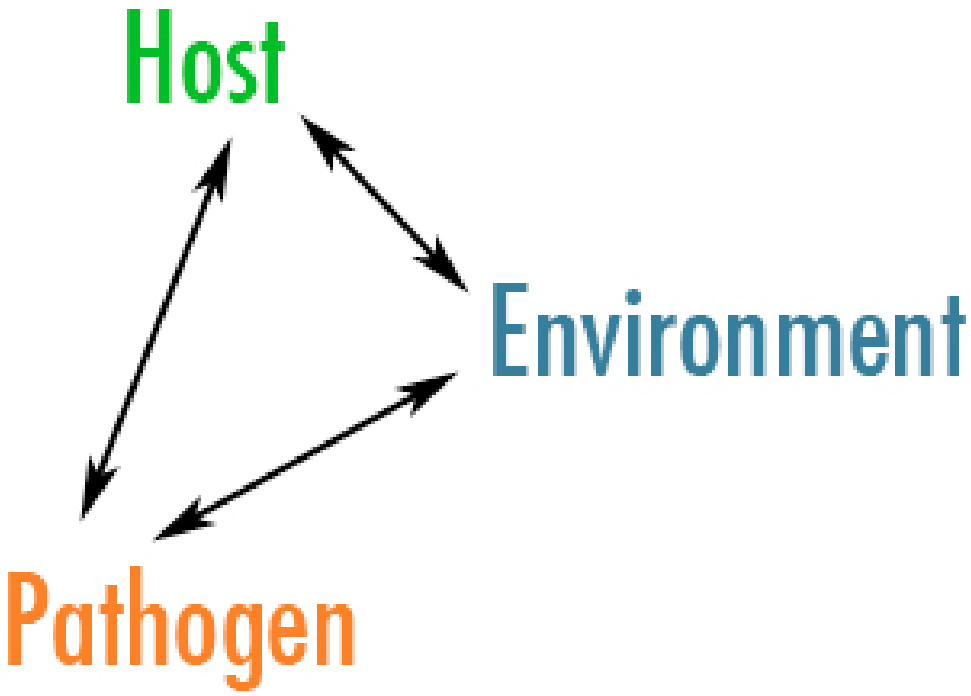
stipplers

THE PARTS OF TREE AFFECTED BY VARIOUS TYPES OF PEST



DISEASE

(Triangle of pathogenicity)



- disases induce organisms called a pathogens and vice versa
- a pathogen is an agent that causes disease
- pathogen can be only living organism such as a bacterium or fungus (virus)

Which of fungi?

- According to the way of nourishment we can divide them into three groups:

I. saprophytic
II. parasitic
III. symbiotic

Obligate saprophyte

- decays dead organic matter

Facultative saprophyte

- an organism that is usually parasitic but may also lives as a saprophyte

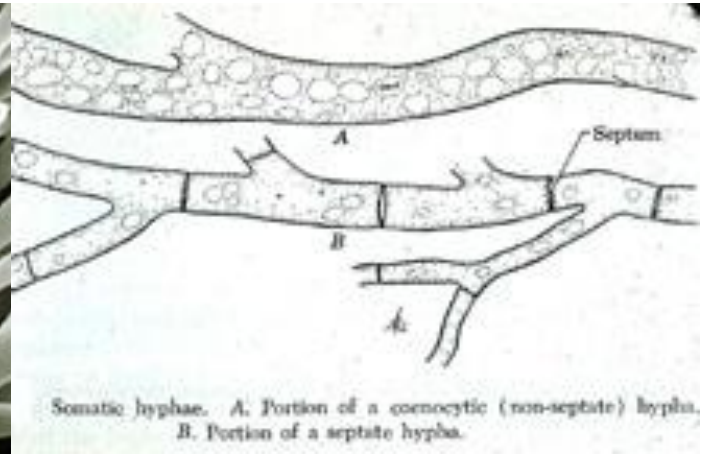
Obligate parasite

- a parasite that can only feed on the living tissues of the host. Does not grow on artificial culture medium!

Facultative parasite

- An organism that is usually saprophytic but which under certain conditions may become parasitic e.g. a fungus capable of operating at two trophic modes - decomposer and consumer.

- unicellular (yeast) or filamentous
- Hypha (pl. hyphae) is the basic “cellular” unit in filamentous fungi; they may be septate or coenocytic (aseptate); collectively a mycelium
- limited tissue differentiation and division of labor
- somatic & reproductive structures



Somatic hyphae. A. Portion of a coenocytic (non-septate) hypha. B. Portion of a septate hypha.

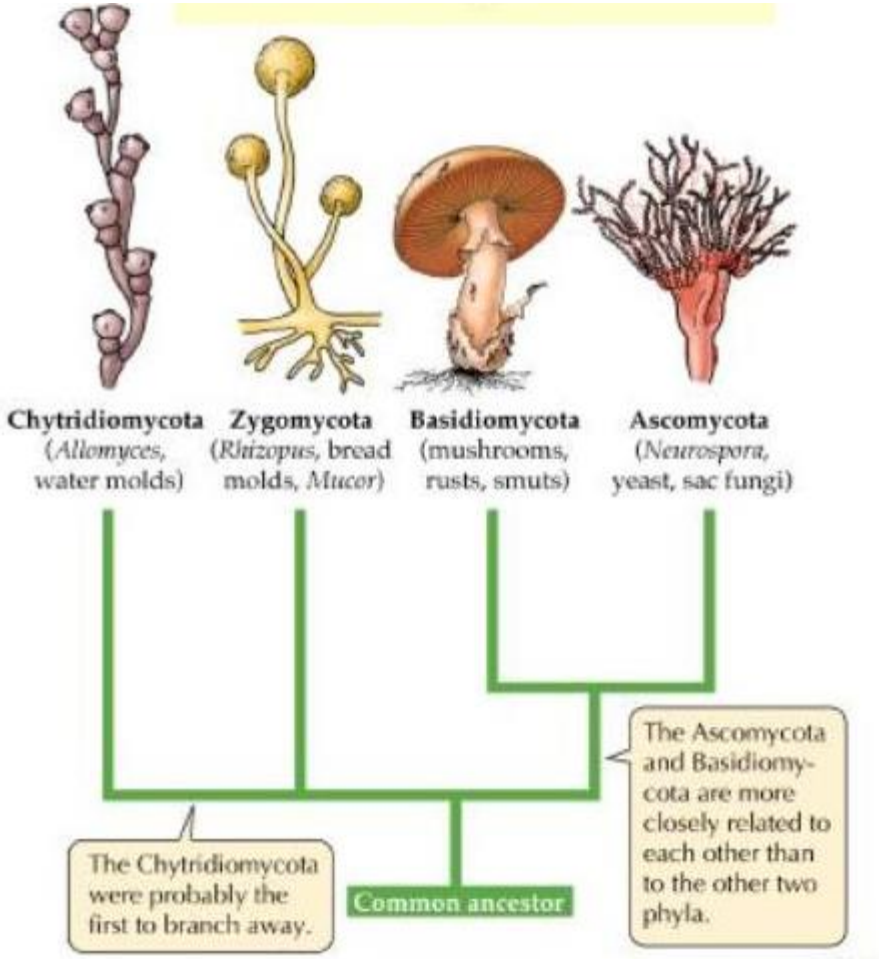
Spores - a minute propagative unit functioning as a seed, but differing from it in that a spore does not contain a preformed embryo

Fruiting body - any complex fungal structure that contains or bears spores; a sporocarp

Phylogeny of Kingdom Fungi

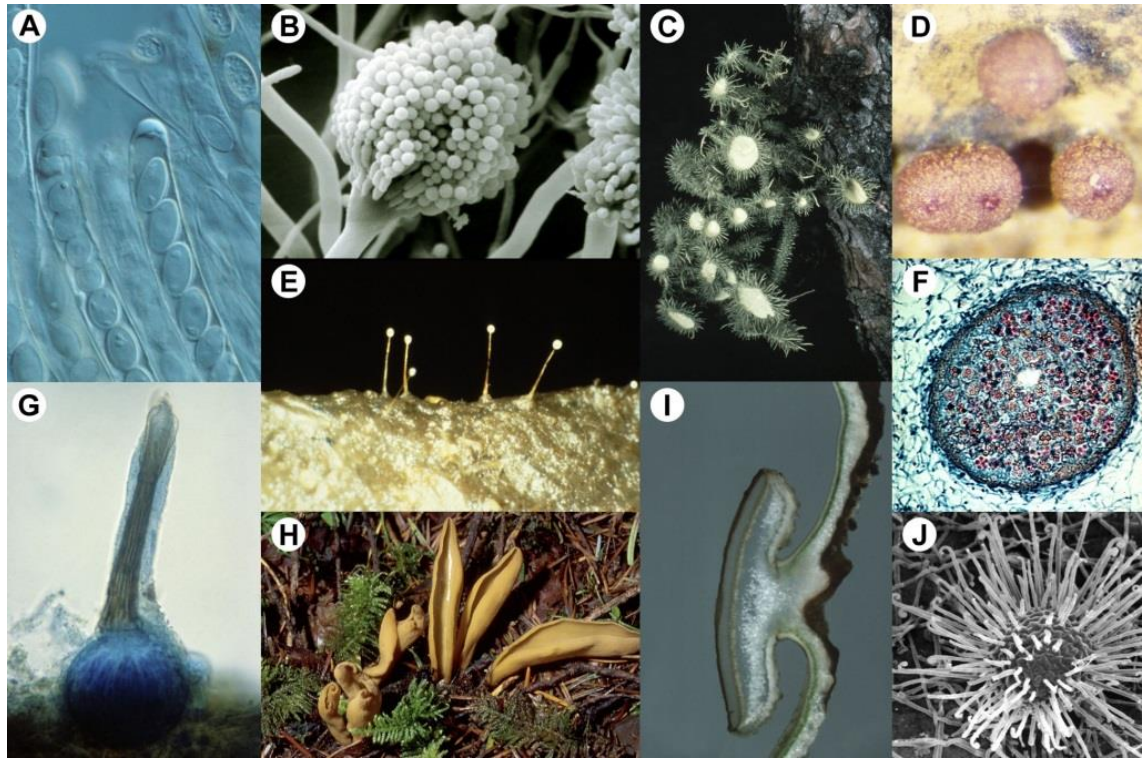
Division

- Chytridiomycota
- Zygomycota
- Ascomycota
- Basidiomycota



Ascomycota: (35 000)

- septate mycelium
- production of endospores (ascospores) in an ascus
- often dominant asexual reproduction



Basidiomycota: (22 500)

- septate mycelium
- production of exospores (basidiospores) on a basidium
- production of complex sporocarps

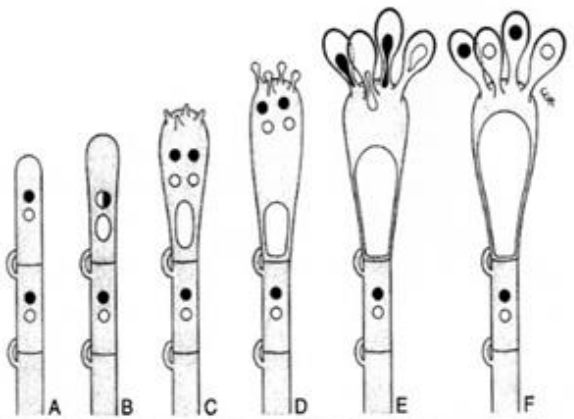


Figure 16-6 Successive stages in development of a basidium and basidiospores. (A) Binucleate hyphal tip. (B) Uninucleate, diploid basidium following karyogamy. (C) Postmeiotic basidium with four haploid nuclei. Sterigmata have begun to develop. (D) Basidiospore initials on sterigmata and nuclei preparing to migrate into the spore initials. (E) Migration of nuclei into basidiospore initials. (F) Highly vacuolate, maturing basidium bearing four young uninucleate basidiospores. (Drawing by Carol Gubbins Hahn.)

Three Major Classes of the Basidiomycota

Urediniomycetes - rusts

Ustilaginomycetes - smuts

Agaricomycetes - mushrooms, shelf fungi jelly fungi, coral crusts, puffballs

Erasmus+

In forest trees, decay is generally caused by fungi, although there are a few bacterial decays associated with trees

Most polypores are wood decay fungi. There are two fundamentally different ways in which wood can be rotted.

Brown rot fungi can degrade only the white cellulose and leave the brown lignin behind.

White rot fungi degrade the lignin and leave the white cellulose behind (honeycomb rot).

Breaking into cubical blocks